10: Horne11 E,N-4,5 (1925) 1936 OU9 Tonga OU9

between 12 and 15 inches. (See fig. 180.) There are indications of a definite head and stern, one end being sharp or bluntly wedge-shaped, the other roughly pointed, characteristics also of Samoan and Tahitian hulls. The ends are solid for a distance of several inches.

The outrigger consists of two straight booms, projecting outboard on the port side 5 to 7 feet, and commonly connected with the float (*hama*) by U-shaped withies (*tukituki*). The float is cylindrical; in the smallest canoes it is pointed at both ends, in the larger only at the fore end, the other being truncate. As in Samoa the fore, free part extends well forward, though not quite to a level with the head: the after end, behind its attachment to the boom, is short.

The U type of connective, characteristic particularly of the *bobao*, consists of a pair of tough flexible withies to each boom, each withy bent into a deep bow or U shape, the limbs spread from 8 to 10 inches apart in the *bobao* and about 12 inches or more in the *tuingutu* (fig. 181).

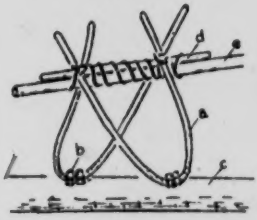

FIGURE 181.—Double U-shaped outrigger attachment, Tonga: each withy (*a*) lashed at its base to two pegs (*b*) driven into float (*c*); horizontal cross bar (*d*) tied under crossed arms of withies; end of boom (*e*) then slipped under cross bar and the two lashed together by several turns of cord or sennit (Vavao, 1925).

The bent base of each withy is secured to the upper side of the float by lashing passed around two short, stout pegs driven abreast into the float. One of the pair of withies is attached to the float some inches forward of the axis of its boom, the other at an equal distance on the after side. The pegs to which the withies are lashed project about 2 inches; the heads are slightly swollen.

The limbs of each U are turned obliquely upward, inclining toward those of the opposite pair, with the result that the upper ends of the two withies cross one another. To keep them in position, a short rod of *toa* (*Casuarina*) is inserted as a brace immediately beneath their decussation and lashed thereto in this position. To make connection with a boom, the outer end of this is slipped under the bracing rod and made fast with sennit lashing.

This accessory device is of service when the outrigger frame has to be partially dismantled: all that is necessary is to unlash the braces from the booms; the float with its connectives held together by the braces may then be removed from attachment to the booms without disturbance of the various parts. Reassemblage can also be effected in a fraction of the time that otherwise would be necessary. In no other Pacific area does this device exist.

Exceptional forms of float attachment are occasionally found. In Lifuka a very small and roughly made *bobao* was seen in which the connection was by means of paired straight stanchions of the type characteristic of the *tuingutu* (fig. 180, *a*). Another in the same island had a mixed connection, the after boom having the paired U connection, the forward one the paired stanchion form.

A third attachment is found on the great shallow backwater lagoon in Tongatabu, where there are in use a few rude dugouts of such low freeboard that direct

10: Hornell E,N-4,5 (1925) 1936 0U9 Tonga 0U9

501 [283] They rest upon the edges of the washstrakes, to which they are lashed by sennit or by cord passing through, usually, one hole a little below the gunwale.

The float varies considerably in shape and relative length; in the smaller or paddling canoes it is cylindrical, the fore end conical, the after one truncate; in the larger, which are frequently used under sail, it is roughly canoe-shaped, flat above, rounded below, and with the ends sliced away on each side and from below to a point.

501 284

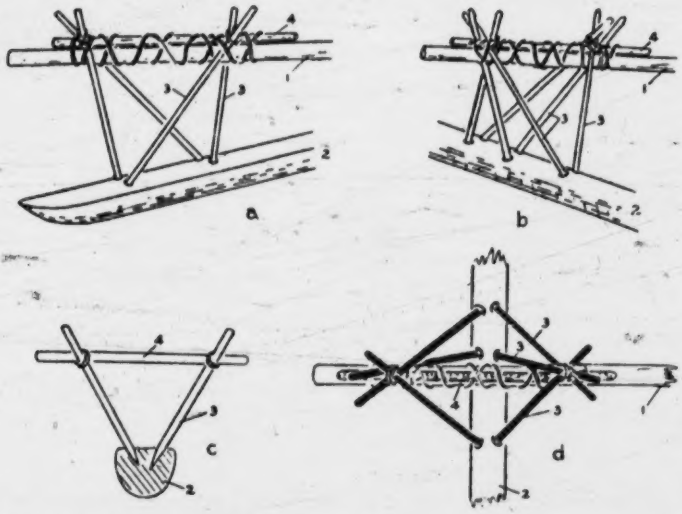

FIGURE 185.—Tongan stanchion attachment: *a*, two-paired, and *b*, three-paired form of stanchion attachment; *c*, attachment separated, float seen in cross section, only one pair of stanchions shown; *d*, top view of *b*; 1, boom; 2, float; 3, stanchions; 4, brace rod.

501 [71] The float connection is either of the U type or by means of paired stanchions. The U type is the same as described for the *bobao*; the stanchion type is comparable with the Samoan and Fijian types. Two varieties of the stanchion type exist, the double and treble. The double, except in one detail, is similar to the Fijian, two pairs of obliquely converging stanchions crossing above the boom. The detail in which it differs is the use of an intermediate and horizontal brace stick, about 2 feet long (fig. 185), to which the heads of the stanchions are directly lashed prior to the lashing of the brace in turn to the end of the outrigger boom; this is the same device as that employed in conjunction with the attachment of the U connectives in the *bobao*. In the treble variety an additional pair of stanchions is present; these two extra stanchions, which are inserted close together in the float immediately under one side of the boom, diverge upward from this point in the plane of the long axis of the boom, to which they are respectively lashed at the same points as are the members of the two other pairs (fig. 185).

The largest *tuingutu* (fig. 183) was 30.5 feet long, the beam outside at the gunwale 13 inches, at the bilge 20 inches; depth of dugout hull 15.5 inches; width of washstrake 5.5 inches, a total depth of 21 inches; length of float 16 feet 9 inches; distance of float from gunwale 6 feet; booms three, attached 14.4 inches above the float; arms of U connectives 12 inches apart where lashed to the booms; booms 4

10: Hornell E,N-4,5 (1925) 1936 OU9 Tonga OU9

The booms are attached to the float in the normal way by paired stanchions but there are indications in addition of the use of bracing cords, as lines are shown passing around the float at the places where the stanchions are inserted. Over the outboard region of the four booms is lashed a rude fore and aft staging of planks. From the starboard side a balance spar giving purchase to a shroud projects far outboard, its inner end lashed upon or to the side of the second boom.

Unlike the ordinary *tafa'anga*, this large vessel, which has a crew of four, is fitted for sailing. A mast, short and vertical, is stepped apparently upon or just forward of the first boom. The precise form of the sail can not be determined as it is partially furled by being loosely tied up to the mast by a rope passed around it, midway up; from the masthead run a fore stay to the head of the canoe, a side stay or shroud to the outer end of the balance spar, and another, on the opposite side, to the outer end of the second boom, also a back stay to the stern.

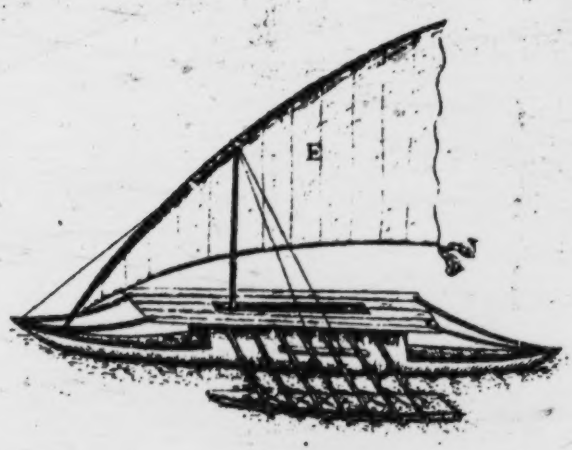

FIGURE 187.—Multiboom canoe seen at Namuka, Tonga, in 1643 (from Tasman, 1898).

A link between the *tafa'anga* as it is known today and the four-boom design drawn by Webber is that figured by Paris (1841, fig. 122) which has two accessory pseudo-booms, equally spaced between the two effective booms. Four paddling thwarts are present in addition to the steersman's seat. (See fig. 186.)

The available evidence points to the early type of *tafa'anga* as a multiboom canoe which by reduction of the median booms both in number and length has evolved into the present design of two effective booms and a median one of a vestigial character.

ANCIENT VOYAGING CANOE

The voyaging outrigger canoes had two forms, an earlier and a later. No description has survived of the earlier type, which was displaced within historic times by a Fijian model. Tasman (1898, fig. 4), however, gives an illustration which depicts a vessel of kindred type to the Fijian *thamakau* but simpler in construction and differing in many important details (fig. 187).

10: Hornell E,N-4,5 (1925) 1936 OU9 Tonga OU9

Corroboration of the course of evolution above outlined is afforded by the form of attachment seen in a canoe of Mare, in the Loyalty Islands, where, although a Y connective is employed, a very short peg is inserted into the float at each side of the shank of the Y, to which both pegs are lashed. This would appear to represent an intermediate phase between the New Caledonian Y and the Tongan U attachment.

On the other hand, it is possible that the U attachment was introduced into Tonga by a section of the Indonesoids who were the last-comers into Polynesia. In the extreme eastern islands of Indonesia the U attachment, but in the single U form, is common and occurs in the same Moluccan localities as the *orembai* and its near relatives. A double U attachment, but undercrossed, occurs along the whole coast of New Britain and in the Witu Islands; in San Cristoval at the south end of the Solomon Islands it recurs and this time in the overcrossed condition. However, in all these instances the U withies are attached to the float by cord lashings passed around the float itself. I incline to the conclusion that the U attachment seen in Tonga, where the withies are attached to accessory pegs and thereby have indirect attachment, has had a different origin as suggested above. Further, what evidence we have indicates that the U attachment is too recent in Tonga to have been introduced from a comparatively ancient Indonesian source.

The story of Oceania contains many instances of the substitution of new designs for old in canoe details; the islanders are receptive and quick to recognize and adopt any detail in the design of canoes of other islands which by accident or otherwise come under their notice. Instances in point within recent times are the adoption by the Marquesans of a plank connective in place of paired stanchions and the Samoan utilization of the whaleboat design in the construction of their great modern paddling canoe, the *taumualua*, displaced in the present century by the long *fautasi*, rowed by many oars.

DOUBLE CANOES

Tongiaki

The *tongiaki* was the form of double canoe in use in Tonga till toward the end of the eighteenth century, when the Tongans began to substitute the Fijian *ndrua* (Tongan *kalia*) as a more serviceable and weatherly craft. Fortunately several excellent illustrations of the *tongiaki* and a fairly full description by Cook himself exist. It happened that the change-over of types was beginning when Cook visited the islands in 1773 and 1774; he saw both and has several references to each.

Schouten (1619, p. 39) came across a *tongiaki* off Tafahi (called by him "Cocos Island") in 1616; it had been drifted out of its course and the crew were in a starving condition:

> [The vessel consisted of] two long and handsome canoes connected together but at some distance apart. Along the midships region of each, two broad planks of red wood were secured upon the edges [one on each side]; across these [washstrakes] small beams were laid [from hull to hull] and over them a platform of planks, the whole carefully fitted and made watertight with all the parts strongly lashed together. Toward the fore part of the starboard hull was stepped a short mast, forked at the top, on which was slung the sail: this was of matting and made after the fashion of those carried by Spanish boats [i.e., the lateen]. . . . Their cordage was strong and well laid. [See fig. 189.]

Two days later they came across two other vessels of the same kind and the chronicler records:

> The crew of one of them had aboard their vessel a canoe which they could launch whenever the occasion required. [Compare the Samoan custom of shipping two *ta'a-alo* aboard

28: Buck D,E-4 (no date) 1941 009 Tonga 009

534 position when played. In lieu of direct information, I again assume that in the double-row pan-pipes, the closed row is next to the mouth because it is the closed reeds which are 534 sounded. It is interesting to note that of the pan-pipes in 171 the Bishop Museum collection, the double-row instruments from the Solomons and the New Hebrides have the shortest reed on the right. The curved open ends appear to be peculiar to Tonga, for all the Bishop Museum instruments from New Guinea and Melanesia have straight upper ends.

534 An examination of the four wider instruments in fig. 1, *a-d*, shows that though apparently arranged irregularly as regards length, they are definitely arranged in two series. In all four, the right series consists of five reeds, commencing on the right with the shortest reed in the whole instrument. Moving in order to the left, the second reed is short, but a little longer than the first; the third is longer still and of medium length; the fourth is long, usually the longest; and the fifth falls back to the same medium length as the third. Thus the fourth longest reed is supported on either side by mediums of equal length.

The left series consists of five reeds in three instruments (*a, b, c*) and four in the other (*d*). The series commences with a short sixth, always a little longer than the first. The seventh is medium, the eighth long and the ninth medium. Thus the long reed (8th) is again supported on either side by mediums of equal length. The instrument with nine reeds stops here, but in the other three, the tenth or left marginal reed differs. In the Cook (*a*) and the Webber (*b*) instruments, the tenth reed is long, but in the third (*c*), the tenth is short, corresponding in length to the first (6th) of the second series. The reeds in the Tongan instruments were thus not placed haphazard, but according to a definite musical scale that Andersen or some other musician could work out if the instruments were available for testing.

The small instrument (*e*) with five reeds is really a half-instrument and though it departs from the preceding types in having the reeds arranged regularly in sequence of length, it follows the general plan in having the shortest reed on the right.

534 The lashing-technique, similar in all five instruments, 284 consists of two spaced rows made with coconut-husk fibre.

[283]

28: Buck D,E-4 (no date) 1941 OU9 Tonga OU9

It was commenced by passing a number of fibres horizontally around all the reeds to form a band consisting of five fibres in the Webber instrument and eight or nine in the British Museum specimens. The ends of individual fibres were brought together and the double ends tied with an overhand knot. A single fibre was then passed back and forth between the reeds and around the horizontal band both back and front as shown in fig. 2, *a-c*. The technique was the same in both rows, but in the Cook instrument, a double fibre was used in the lower row which, after completing one round, was reversed for a second course with resultant crossings on the back of the reeds as shown in fig. 2, *d*. This technique is similar to that used to bind together the lengths of dry coconut-leaflet midribs in both Tongan and Samoan combs.

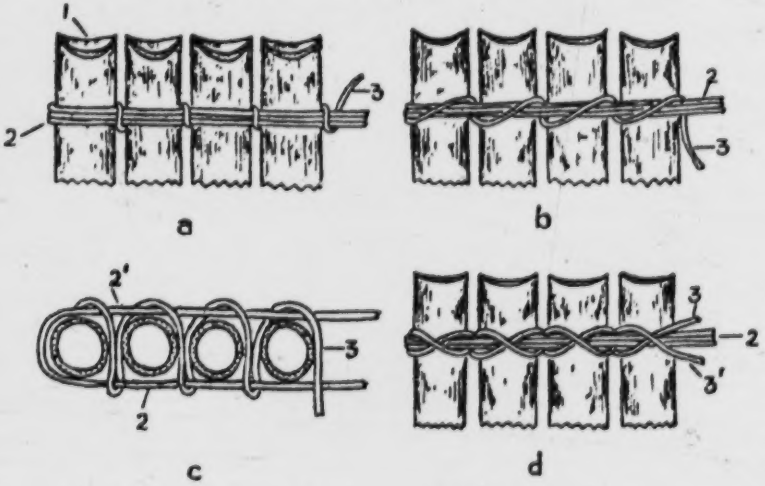

FIG. 2—LASHING TECHNIQUE OF TONGAN PAN-PIPES.

a. Front: 1, Upper ends of reeds, showing lower curved cuts on front; 2, Horizontal band of coir fibre; 3, Binding fibre passing around horizontal band in front between reeds and passing back in same interval.

b. Back: Binding fibre (3) after passing around band (2) in front, passes obliquely to right to pass around horizontal band in each interval.

c. Horizontal section showing horizontal band in front (2) and at back (2′) with binding fibre (3) passing backward and forward between the reeds.

d. Back of lower lashing row in Cook instrument, showing two crossing courses (3, 3′) of the binding fibre around horizontal band (2).

39: Gerstle & Raitt C,Q-4,5 (1952-1972)
1974 OU9 Tonga OU9

532 Tongan art by western or contemporary standards, as has so often been done; it should rather be viewed in terms of the complex social and cultural matrix from which it sprang.

Wood being the main medium used long ago, wood craftsmanship and carving in the form of canoes, houses, war clubs, spears, paddles, kava bowls, statues and wooden "headrest" pillows became a polished art in the Tongan society, performed only by highly specialized artisans called *tufunga,* whose skills were most often transmitted [771] by heredity. As religion was a major facet of life, the [776] Tongans had a god as a patron for each category of artistic activity. Thus, art reflected their system of religious beliefs, values and rituals, as well as their extremely structured socio-political organization.

342 The traditional Tongan house, similar to that of
283 [p. 9-C]
284

342 nearby Samoa, was an oval structure with roof
283 thatching made from sugar cane leaves or coconut
284 fronds, and with exquisite sennit lashing on the inside rafters. Tongan clubs were characterized by
411 skillfully-incised, geometric surface patterns, at
531 times by inlaid pieces of pearl shell or whale's tooth,
237 and occasionally by designs depicting animals (zoomorphs) or humans (anthropomorphs); these decorations were sometimes applied over a period of time, certain bits of ornamentation being added in commemoration of a particular battle victory.[A2]
532 Carved statues, which were used to a minor degree as representations of deities, were usually wooden and female, with a rounded, stout body and an oversized head. The few, excellent ivory statue carvings from Ha'apai preserved today in museums are considered to be among the finest creative art pieces in the history of the Pacific.[B3]

[p. 10-A]

A [See category 411, pp. 9A, 10B and 11--Analyst]

B [See category 532, p. 8--Analyst]

342
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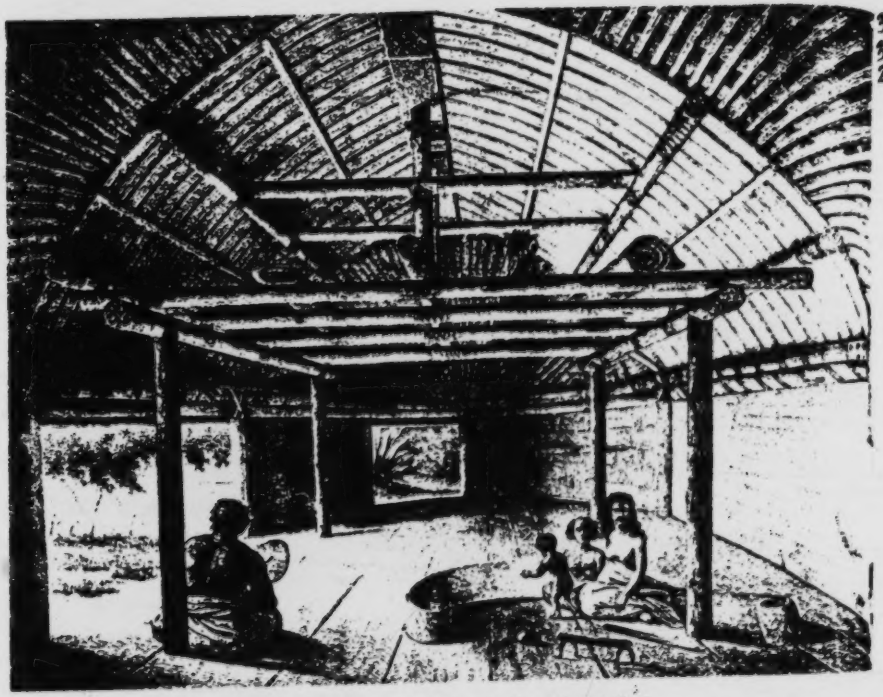
284

39: Gerstle & Raitt C,Q-4,5 (1952-1972) 1974 OU9 Tonga OU9



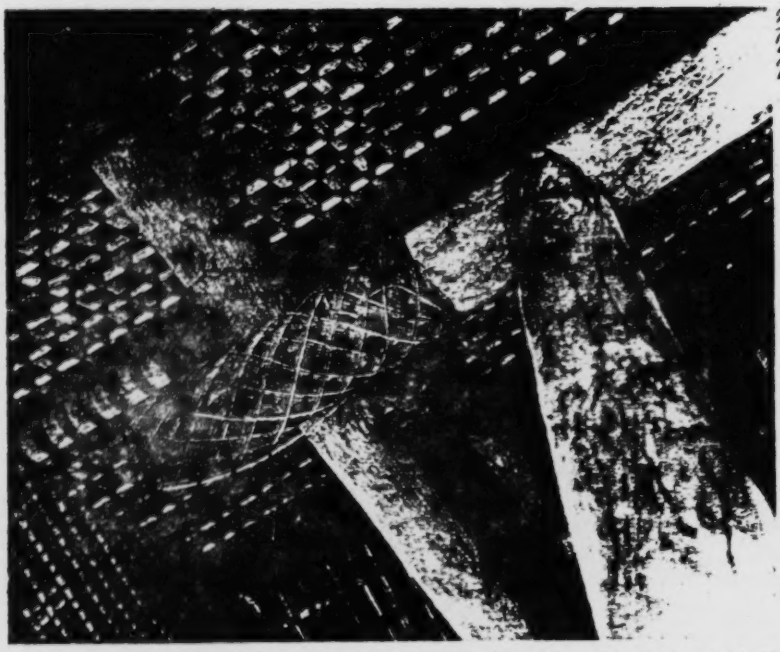
A traditional oval-shaped Tongan house, featuring a neatly constructed interior and artistically lashed beams, is depicted in this engraving (1826) of a house in Mu'a belonging to the wives of the chief Palu.

Kuo lahi foki eni e langa fale papalangi, ka 'i he taimi ko e na'e ngaue'aki pe e ngaahi fale hange ko ia 'oku ha 'i he ta fakatata ko eni na'e fai 'i he 1826. Ko e fale eni na'e nofo ai e kau fefine 'a e 'eiki mei Mu'a ko Palu.

532 evidence of idolatry and heathenism. Whereas wood
177 carving had been done previously with adzes or tools made of shell or tooth, local artisans became attracted to the more highly perfected metal instruments of the foreigners. Strongly influenced by materialism and other characteristics of western civilization, the Tongans abandoned the majority of their former artistic activities, and consequently, the
[462] entire realm of Tongan art has suffered. For the
[287] most part, only the arts of women (e.g. tapa making,
[285] basket and mat weaving) have survived up to the present day in Tonga.[7]

341 Tongan architecture has obviously been
342 influenced by contact with the west; rafter lashing with hand-braided sennit is rarely to be seen any
177 more, and it is not uncommon to find Tongan
283 houses today with corrugated iron roofs.
284 Hand-carved war clubs and other weapons, as well as
44 the skillfully-designed double canoes, have been
501 [P:16-A]
177

39: Gerstle & Raitt C,Q-4,5 (1952-1972) 1974 OU9 Tonga OU9



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Intricate roof latticework and beams lashed with coconut-fiber sennit add richness to this old Wesleyan church (left) in 'Ohonua, 'Eua. The superb lashing (close-up above) is a traditional art form which is slowly being forfeited to modern architectural practices in Tonga.

Na'e lahi **'aupito hono ngaue'aki e kafa** 'i he **langa** fale he taimi ko e, **'o hange ko** ia **'oku** ha faka'ofo'ofa mo maseni 'i he ongo ta koeni 'o ha falelotu Uesiliana 'i 'Ohonua, 'Eua.

55: Anderson D,T-5 (1777) 1967 OU9 Tonga OU9

here, though they are rather intended as conveniencys to their dwellings than a shelter to the plantations. They are made by passing two reeds together obliquely upwards over two others, and so on in such a manner that they form a pretty lattice work with rhomboidal spaces of about two inches to a side, though there are others made quite close by placing five or six together alternately over and under each other. The uneven tops are left uncut and the foot kept clean by digging up the grass with the Hooo, by which care & frequent repairs they seem to last a long time.

It is not easy to guess why these people who in many things show much taste and ingenuity should fall short in building their houses, not so much in the execution but design. Those of the lower people are poor huts scarcely sufficient to defend them from the weather and very small. Those of the better sort are larger and more comfortable but not what one would expect. The dimensions of a middling one is about thirty feet long, twenty broad and twelve high. It is properly speaking a sort of roof or shade, rounded at the ends, reaching to within two feet and a half (or three at most) of the ground all round, under which they creep in. It is supported by strong posts plac'd commonly at equal distances a little within the edge, with others laid along upon their tops and some laid across from these, which again have perpendicular ones rising from their middle to support the top ridge. These are firmly lash'd together with a cord made of Cocoa nut fibres, in which they indicate their taste for variety by mixing white and black so as always to represent som[e] regular figure. The frame on which the thatching is supported consists of well made laths laid in a very regular manner from top to bottom, with others running across in the same manner without them & fastend with the Cocoa cord. The thatch is chiefly of Cocoa & other leaves laid over these laths in such a way, by being doubled under them & intercepted by the next, that they need little fastening and to a thickness which makes them proof against the rain or wind. Some of the principal people have houses almost twice as large, and the Ma'laees or houses of public resort which are pretty numerous are still larger; but there is a sort commonly smaller than the dwelling houses, almost round and well clos'd on every side with reeds plac'd close together, except a small square hole to creep in at. These serve as store houses to preserve their cloth, matts, yams & other spare things in that their dwelling places may not be incumbered, and are so contriv'd that the reeds composing the sides point outwards, so that it seems to stand upon a narrow base, which with the thatch projecting over a little way effectually prevents any rain getting in. The houses of the

92: Kaeppler E-4 (1964-1967) 1971
0U9 Tonga 0U9

one of the natives sold a very small nail carefully fastened in a handle of hard wood, and tied to it by strings of coconut-core. This nail was undoubtedly left by Tasman, who was there in 1643, and consequently had been preserved 130 years, and is now lodged amongst other curiosities in the British Museum' (1778: 368). Perhaps there is such an implement in the British Museum with a nail lodged in hard wood; however, they have no record of it. The Pitt Rivers specimen has a handle of bone—a perceived Tongan alternative which probably indicated that its use was restricted to the higher ranks as we have also seen in the bone and wood handles of fly whisks (i.e., Bern and Pitt Rivers specimens). It is certainly possible that there were at least two such hafted nail implements, for Cook discovers on his third voyage, that,

> on my enquireing of Fattafee the King how they came by the Knowledge of iron and a small iron tool I saw here last Voyage, he told me it came from Onnuahtabutabu [Niuatoputapu], and on asking him how the people of that island came by it, he said one of them sold a Club for five Nails to a Ship which came to the island [Wallis in 1767], and that these five Nails after wards came to Tongatabu and were the first they had seen, so that the Iron they got from Captain Tasman must have been worn out and forgot long ago (Beaglehole 1967: 162).

Two implements almost identical to the Forster shark-tooth example exist in Dublin and another in Vienna. The Vienna specimen was noted in the first inventory of the collection as an engraving instrument from Tonga (Moschner 1955: 139), and has a bark cloth padding under the sennit binding—a very Tongan way of hafting, also used for the hafting of adzes. Finally, yet another specimen is engraved in Labillardière (1802: plate 32) with a very good accompanying description:

> we saw several [Tongans] who were employed in carving others [clubs] with shark's teeth fixed into the extremity of a piece of wood. We were astonished to see them quickly notch, with this sort of chisel, *casuarina* wood, notwithstanding its extreme hardness. Others already used with much dexterity some of the iron instruments which we had given them (1802: 147–8).

In this case there is no possibility of confusion with Tahiti, for Labillardière did not go to Tahiti.

One specimen in the Pitt Rivers Museum (plate 5a) appeared at first to be not Tongan at all and its use was even more mysterious—a large thin plate of whalebone with the edges curved and having three holes at one edge and labelled Number 62. Before the original Forster catalogue was found, it was labelled New Zealand. The *Catalogue*, however, lists Number 62 as 'a Shield made of Bone, probably of a cetaceous animal', and is designated as Tongan. In George Forster's account of the voyage we find the description and collection information: 'we bought a large flat shield or breast-plate, of a roundish bone, white and polished like ivory, about eighteen inches in diameter, which appeared to have belonged to an animal of the cetaceous tribe' (1777: 455). The Pitt Rivers specimen measures 18 inches and an almost indentical specimen exists in the Forster collection in Göttingen. There is also a larger and thinner one in the British Museum (no accession information or provenance). How or when these specimens were used, we are unfortunately not told. One could suggest, however, that this is a large and ostentatious rendering of a shell breast ornament in whale bone, which was a material of high status. The

A. [See End Plate 5, following p. 220--Analyst]

/126 cont./

342 (113)

346. On the subject of ancient Tongan house building: J. Cook, Voyage dans l'Hemisphere Austral.../Voyage in the southern hemisphere/. II. p. 68; the same, Beschreibung.../description/ loc. cit. VI. p. 285; G. Forster, loc. cit. V. p. 139; W. Ellis, An authentic narrative... /cited in English/. I. p. 95; J. Martin, loc. cit. II. p. 279 ff.; J. Dumont d'Urville, Voyage pittoresque /Picturesque voyage/... II. p. 78; Tischner, Die Verbreitung der Hausformen in Ozeanien /The dissemination of house forms in Oceania/. Dissertation. Hamburg 1934. pp. 93/94, 139, 177.

and traditions give us no comprehensive insight into the ancient Tongan dwelling. However, we know that it was a long house with rounded narrow sides. The average house of a chief was approximately 30 feet long and 20 feet wide. (347)

347. See J. Cook, Beschreibung...loc. cit. VI. p. 285.

342 335 Four (or six to ten) posts were connected with a longitudinal beam on which rested four (six) crossbeams which, with their projecting ends, supported a ridge roof /127/ that was additionally held up by special supports on the framework. Nails and mortise were unknown.

(284) (824) The beams were lashed together with cords of coconut fiber; these were of different colors (natural-colored, black, red and yellow), and the individual, careful lashings represented "geometric" patterns.

342 824 The roof at the top was about 12 feet high and extended to about four feet beyond the floor. It was covered with sugarcane leaves or--more simply--with coconut leaves. These were plaited together like mats and were fastened like tiles to the rafters. The ancient

342 Tongan dwelling very probably had no walls. As a protection against rain, wind, or lower temperatures, the better houses had curtains of mats fastened together, which could be lowered, while in the simpler houses people made do with mats which they hung up. (348)

/130 cont./

342 at that time). They have apparently been built in Tonga since the turn of the century.

342 For 33 of the European-type rectangular houses in 'Uiha/'Uiha and
179 for 21 of these in Fungamisi/Vava'u, the following building costs /sic/ were obtained:

	in 'Uiha	in Fungamisi
built between 1890 and 1900.....	1	1
1900 " 1910.....	17	3
1910 " 1920.....	4	5
1920 " 1930.....	2	3
1930 " 1940.....	2	3
1940 " 1950.....	4	2
1951.....	3	4

342 The "ancient Tonga-style" houses hitherto mentioned do not
178 correspond exactly in their construction to the model of old times.

Their construction (framework) in part resembles that customary in former times. Not only in some houses covered with indigenous
[284] material, but especially in those covered with corrugated metal, one
[283] often finds a strong and carefully constructed framework with lashings of coconut-fiber cord.

94 dwellings (of commoners) with ancient Tongan ground plan were examined in 1952 in 'Uiha/'Uiha.

3 of these had a "very good" construction which approximately corresponds to the kind described in the old sources (insofar as these give more detailed information on the subject); /131/ only the beams were no longer polished (smoothed over) with the former meticulous care and the lashings perhaps somewhat simpler. These houses were built around 1880, 1931 and 1933, according to the memory of the natives (The 1931 building was first used as a church, then as a dwelling.

44 had a construction much like the ancient Tongan, and can be described

/136 cont./

412 [824] and make the handle themselves (length 85-90 centimeters) out of wood of the toa tree (Casuarina equisetifolia L.).

There are various transverse hatchets; the iron blades are bought [177] [439] [824] and then hand-shafted as desired. To make a fale-vatu lahi the natives like to take an ordinary European hatchet blade of the type which was formerly traded in Tonga by German commercial firms, and provide it with a forked-branch shaft of the feta'u tree (Calophyllum [284] [283] inophyllum). The blade which lies crosswise is fastened (lashed) with coconut-fiber cords (kafa) that are drawn through the eye (provided for the handle by the European factory). The blades necessary for such [439] transverse hatchets can at present no longer be bought from merchants in the Archipelago; the ones in use, which some of their present owners have inherited from their grandfathers, are therefore

[284]

Transverse hatchet (fale-vatu)
with European blade (Expedition Collection, No. 102)

of special value and handled with great care. Sometimes the rear abutment on the shaft, which has to absorb the blow, is protected against splintering by having some six nails driven in. In a typical specimen of the fale-vatu lahi, the measured length of the blade was 18 centimeters and the maximum width 15 centimeters, the length of the handle [342] [335] was 47 centimeters. In house-building, longitudinal grooves are cut

/136 cont./

412 into the coconut-palm pieces of trunk with the fale-vatu lahi in order
(342) to make the rafters (kahoki) (see below). This transverse hatchet--
(335) with the same shape and shaft--also occurs in a smaller version known
(322) as fale-vatu si'i, and is used preferably to "plane" the rafters (chip off unevenness). The toki taha-taha and the toki tele are used for the same purpose. The smaller hatchets (handle length about 30 centimeters) have European planing blades, again mounted crosswise, with the cutting edge fastened to a forked branch with a kafa lashing. Here too the handle usually consists of feta'u wood. In the case of the toki tele are used for the same purpose. The smaller hatchets (handle length about 30 centimeters) have European planing blades, again mounted crosswise, with the cutting edge fastened to a forked branch with a kafa lashing. Here too the handle usually consists of feta'u wood. In the case of the toki tele, parts of a coconut husk are used as a blade cover. Another small transverse hatchet (handle length 25 centimeters), the toki unga ko, may be mentioned. Here a European gouge approximately 20 centimeters long with its curvature resting on an insert of toa wood is attached with a kafa lashing to a feta'u forked branch. Owing to the insert, this blade can be turned and thus makes possible various semicircular cuts.

412 177 284 824

The transverse hatchets mentioned here are often also bound with wire (or hemp) instead of the coconut-fiber cords.

412 177 These transverse hatchets are an interesting fusion of ancient Tongan and European tools: the natives have generally replaced their stone blades /137/ with the various more efficient metal blades, but have retained the old Tongan type of shaft so that they can use the new tool for their traditional working methods (see below). (366)

366. The transverse hatchets are used not only in house-building, but also in woodwork generally (for example, boat-building, see p. 351-353).

/ 143 cont./

342 hence only temporary posts are set up. Into the grooved ends the men
331 place the horizontal beams, their position tested with an English
335 water level, and raise and adjust the posts with a traditional lever
[177] tied to each post. Four crossbeams are laid over the longitudinal
[401] beams, and the parts that belong together are lashed with coconut-fiber
[284] cords (kafa) that have been soaked in water. Then the men place two more longitudinal beams over the ends of the cross beams and fasten them the same way with kafa. They put up the ridge lath and ridge
[284] board, supported, for the time being, by provisional posts, at the proper height above the construction and hang the notched rafters to the ridge lath with coconut-cord lashings. The downward extending rafters rest on the longitudinal beams lying on the ends of the
[177] crossbeams. Here they are lashed and at the same time nailed on with European iron nails; this is the part that must then bear the main burden of the construction. The rest of the longitudinal beams are fastened to the lower part of the rafters and to the upper part of the roof with coconut lashings and nails. Then the roof laths are lashed (from the inside) and nailed down. The traditional roof brackets are attached to the crossbeams.

342 Up to this point the entire work procedure--except for the
331 European or Europeanized tools and the use of nails--resembles the
177 ancient Tongan house construction. But now, in place of the coconut-
335 leaf mats (pola) (to be plaited by the women) /144/ pieces of corrugated sheet metal are nailed onto previously applied strips, as roof covering. Then three curved sections of a beam are joined to form a round beam (corresponding to one of the rounded narrow sides of the house). Instead of the customary system of coconut-fiber lashing, they follow the European method of boring through the obliquely sawed ends with a drill and joining them in iron clamps

/144 cont./

342 331 335 177 with wooden tenons. Two of these round beams form the framework of one narrow side of the roof; as in old times, they are set on the ends of the main horizontal beams (375)

(284)

375. That is, the horizontal beams resting on the four posts.

and fastened to them with coconut-fiber lashing. Rafters and roof (412) laths are tied over them and nailed, and here, too, strips and corrugated sheet metal--laboriously cut with sheet-iron shears--are nailed on.

It is only now, when the roof is finished, that the men apply themselves to the walls which are built in a quite "modern" form. (333) They pour a cement foundation all around the house (according to the ground plan) in which screws are inserted. To these they screw beams which form the basis for a wall framework to be built between the foundation and the edge of the roof. On this framework they nail the wall boards, allowing for window- and door- openings. Then they take out the four posts which are so important for the ancient Tongan house (which here were set up only temporarily) and replace them with supports extending obliquely from the base of the walls to the joints. The roof now rests partly on the walls--a very considerable change for Tonga.

342 331 The rest of the work is slowly carried out, for the general enthusiasm has abated, especially since the rations have become scarcer (after the boss's last beef has been consumed). Because Christmas preparations are now beginning in the village, only a few willing workers appear at the building site. They cover the floor of the house with sand, paint the outside of the new building with light blue oil paint, attach a gutter and start to make the doors, until the building material gives out and the work stops. However, the

/233 cont./

501 178 612. Today also with cotton or cement.

and of which only a very few exist in the Archipelago, will probably soon share the fate of kalai which disappeared seven decades ago.

501 A tafa'anga boat observed on Nomula Iki in December 1951 was built there that same year by a Tongan (from Niua Toputapu) and was used for short trips between Nomuka and Nomuka Iki. [824] The keel was made of wood of the ifi tree (Inocarpus fagiferus [Park.] Fosb), the planks and the float were made of fau wood (Hibiscua tiliaceus), the outrigger poles could not be definitely determined, and the connecting timbers (four) between the three outrigger poles and the float were made of [284] toa wood (Casuarina equisetifolia L.). There were holes bored in the planks which were held together with coconut-fiber lashings. Old tapa served as caulking. Two seat boards were nailed on fore and aft. The body of the boat had a coat of crimson oil paint to protect it against sea water. Two paddles propelled the boat.

501 177 178 Aside from the European additions (nails in the seat boards and oil paint) this boat in its rather crude form seemed unchanged from its ancient Tongan model, which had polish-like smoothness and was ornamented, (613)

[113] 613. See G. Forster, loc. cit. IV. p. 347; Tagebuch einer Entdeckungsreise... /Diary of a voyage of discovery/ translated by J. R. Forster, Berlin 1781. p. 93.

and used for bonito fishing, no longer practiced today. (614)

614. See Th. West, Ten years...p.146.

501 The popao, namely the simple (and unadorned) dugout outrigger boats, are the universal craft used for short-distance trips. They usually take on one or two persons and are propelled with wooden paddles (having an oval or pointed-oval blade) or with improvised, trimmed coconut-palm-leaf stems. Sometimes the natives also use a

/234 cont./

396 412 use the quite effective toki hoka that consists of a handle about 1.60 meters long and with a larger gouge screwed to one end, with which the wood can be forcefully chipped off. The outer surface of [177] the hull is hewn with the transverse hatchet fale-vatu (see p. 200-202) until it shows the proper curvature and seems almost smoothly planed; if possible, however, they work with a European iron plane.

[284] [824] To attach the two outrigger poles (kiato) (616)

616. For example, from wood of the milo tree = Thespesia populnea (L.) Solander.

they drill holes with a European drill at two opposite points of the boat's side, enlarge the holes with a red-hot iron, place the outrigger poles (their ends notched with the small transverse hatchet) crosswise over the rims of the boat's side and lash them in this position with coconut fiber cords soaked in water, which are drawn through the bored and burned holes and are tightly and neatly wound and finally pounded firm with a small transverse hatchet (used as a hammer). Sometimes they also connect the two outrigger poles about 0.80 to 1 meter from the hull with a rod ('akau puke) (617)

617. Of milo-wood, for instance.

lashed to them, in order to achieve greater strength of the outriggers.

396 [824] The float (hama) (618)

618. For example, of mohokol wood = Cananga odorata (Lam.) Hook. f. and Thomson.

which has already been prepared, with ends tapering to a point, is then provided with four (or five to six) drilled holes (European drill) in the two sections where the outrigger poles are to be fastened; into the holes, trimmed and pointed struts (tuki-tuki) (619)

[824] 619. For example, of toa wood = Casuarina equisetifolia L.

100: Koch--513 E-4,5 (1951-1952) 1955 OU9 Tonga OU9

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342
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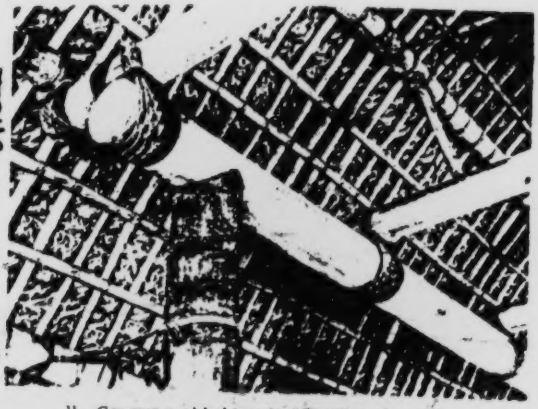

11. Coconut cord lashings in a dwelling

291
335
412

12. Making rafters with the transverse hatchet fale-vatu

[End Plate 6]